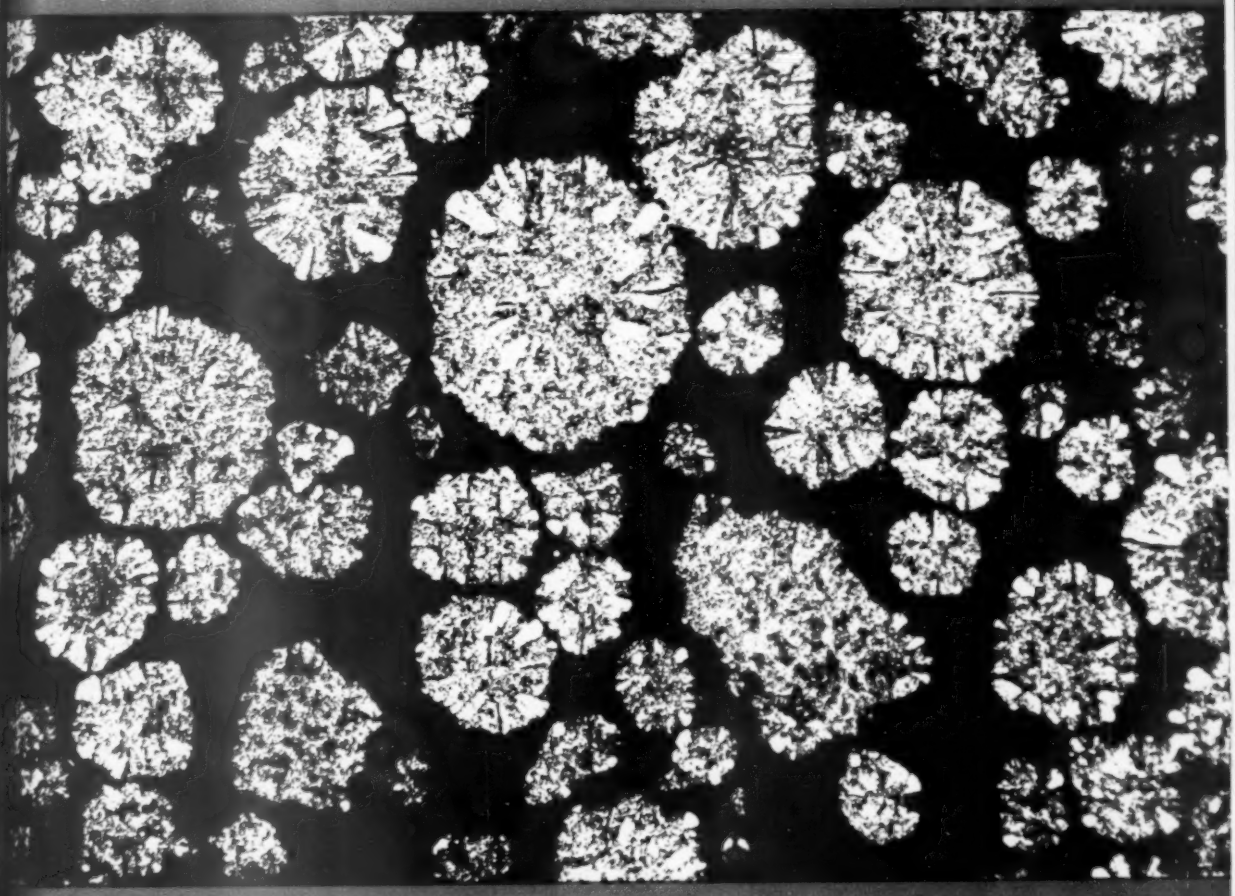
15¢
$5 A YEAR

December 23, 1961

VOL. 80, NO. 26 PAGES 405-424

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Atomic "Snowflakes"

See page 415

A SCIENCE SERVICE PUBLICATION

SPACE

Satellite for Radio Hams

➤ A NEWBORN satellite, Oscar, carried out of this world piggyback by its big brother, Discoverer XXXVI, is now spinning across the skies saying "hi" to radio hams all over the world.

With the successful launching of OSCAR (Orbital Satellite Carrying Amateur Radio), a new kind of cooperation between the U.S. Government and amateur radio operators was born. Oscar, developed by a group of California hams, was allowed to ride the Discoverer for the purpose of obtaining information from outer space and to introduce to amateur operators throughout the world new methods of radio communication.

The ten-pound Oscar is a miniature shortwave radio transmitter beaming the letters HI in Morse code (four dots followed by two dots) back to earth. The frequency of this friendly message is 145.0 megacycles (millions of cycles a second).

This is the international frequency assigned to amateur operators, who can pick up Oscar's greeting with simple receiving equipment. Radio hams and others interested are expected to track Oscar on his travels around the earth. Oscar operates on one-tenth of a watt.

The Discoverer satellite has its own job to do after delivering Oscar to the skies. It is part of the large overall U.S. Air Force project on space recovery. Oscar meanwhile will be an aid to ham operators training themselves in the field of electronics and trying to expand their range of communication. The Oscar satellite is the latest in a long series of experiments undertaken by the hams since the advent of radio. During the 1930's, radio hams experimented with ultrashort waves, now known as very high frequencies, especially the waves near those used for the lower TV channels.

At first both scientific theory and amateur practice indicated that the very high frequencies were only useful for very short distances, but the amateurs proved that long distances could be covered.

Layers of air of varying temperature and humidity could form a kind of tunnel through which the waves could travel. Ham operators sent messages 100 miles during the 1930's. In 1957 amateurs sent messages this way from California to Hawaii, a distance of 2,500 miles.

Amateur radio operators cooperated with scientists during the International Geophysical Year from 1957 to 1958. The hams gathered information on how radio waves travel through the ionosphere, according to the American Radio Relay League.

The radio hams bounced radio messages off the Echo satellite for long-distance communication and are planning expanded efforts for the upcoming Echo II passive communications satellite.

Amateurs have also bounced radio signals off the moon for coast to coast communication, using only one-fiftieth the power used by military stations.

• Science News Letter, 80:410 December 23, 1961

SPACE

Capsule Needs Name

➤ THE UNITED STATES space agency is looking for a name for its latest brain child, a two-man space capsule that will meet another spacecraft circling around the earth.

The capsule could be given such a name as Vulcan, for the Roman god of fire and metal working, because the ultimate goal of this rendezvous in space is to join various stages of a space vehicle capable of traveling to the moon and planets.

Most rockets and spacecraft of the National Aeronautics and Space Administration are named for Roman gods. The Mercury capsule, carrying two astronauts on suborbital flights, was named for the messenger of the gods. The Saturn rocket, having a thrust of 1,300,000 pounds in its first trial model, was named for the father of the gods. Jupiter, giving his name to another rocket, was one of Saturn's children. The Atlas rocket is the namesake of the titan condemned to uphold the heavens on his shoulders for fighting against Jupiter.

The new capsule program will be an extension of the Mercury effort. The new craft, still in the planning stage, will have the same shape as the Mercury capsule but it will weigh two to three times as much as the one-ton Mercury.

The base of the two-man craft will be larger than the Mercury capsule, providing 50% more cabin space. The new capsule will be able to take week-long trips around the earth, enabling astronauts to train for longer flights. Two-man flights could begin in 1963-64. The new craft will be boosted into space by a Titan (a primeval deity) II and will rendezvous in space with an Agena rocket stage launched by an Atlas booster. When both vehicles are in orbit, propulsion in both the capsule and the Agena can be used to perform rendezvous and docking maneuvers.

The rendezvous technique could be used to assemble the three-stage Apollo (the god of youth, poetry and music, and later the sun god) capsule scheduled to land men on the moon in 1970.

The names committee of NASA decides on an appropriate name for each project with the approval of James E. Webb, NASA's Administrator.

• Science News Letter, 80:410 December 23, 1961

TECHNOLOGY

Electronic "Brain" Turns Symbols Into Talk

➤ A METHOD by which a large electronic "brain" can talk to anyone was reported to the Eastern Joint Computer Conference in Washington, D. C.

The system, called a digital to voice converter, combines photographically stored information and voice recordings. It is still in the development stage, Evan L. Ragland of Motorola, Inc., Chicago, told the Conference.

Vocal information from a computer would be particularly useful in air traffic control for producing flight plans, giving pilots clearance and presenting weather information. Other prospective uses include in banks, for automatic inventory control, and for dialed weather information.

The techniques tested for the digital to voice converter promise to result in compact and inexpensive equipment, Mr. Ragland reported. The converter would translate the binary code used by the computer into voice in the following manner:

A vocabulary of several thousand words is stored photographically in the memory. The photographic word is projected onto an electrically charged, photosensitive plate if it is the one needed according to the binary code being translated. The entire vocabulary is optically scanned at a rate sufficiently high to provide the needed word in a time imperceptible to the listener. That word is then played by the recorder.

Mr. Ragland pointed out that although the English language has 600,000 words, the average vocabulary is only 15,000 words. Of these, 1,000 words account for 80% of all usage and only 50 words account for 50% of all usage. Since a 1,000-word vocabulary allows expression of most ideas, he believes a vocabulary of several thousand words could provide computers with a conversational capability.

• Science News Letter, 80:410 December 23, 1961

GEOPHYSICS

Earth Has Dust as Well as Gas Tail

➤ THE EARTH has a tail of dust as well as of gas, two U.S. astronomers suggest.

Drs. John C. Brandt and Paul W. Hodge of the University of California, Berkeley, said the dust tail is probably acted on by pressure of the sun's radiation in much the same way as comet tails are. Their suggestion of a dust tail for earth follows the discovery from satellite measurements of a concentrated dust layer surrounding the earth.

The earth's dust tail is formed from smaller particles blown out of this dust ring by radiation pressure, the astronomers report in Nature 192:957, 1961. They made their suggestion as an explanation for the gegenschein, a soft luminous glow seen in the sky opposite the sun, which is also called the counterglow.

• Science News Letter, 80:410 December 23, 1961

ASTRONOMY

Sunspot Cycle Theory

The sunspot cycle has been found due to the different rates of rotation of charged particles on the various parts of the sun, being more rapid at the equator than toward the poles.

➤ THE SUNSPOT CYCLE of approximately 11 years, an important solar phenomenon affecting the earth's atmosphere, is due to the different rates of rotation of charged atomic particles in the sun.

This new theory advanced by Dr. Horace W. Babcock, assistant director of the Mt. Wilson and Palomar Observatories, in California, is reported in the annual report of the Carnegie Institution of Washington. The Carnegie Institution operates these observatories jointly with California Institute of Technology.

Dr. Babcock advances the idea that the sun's hot, gaseous mass of charged particles rotates more rapidly around the middle than toward the poles. The more rapid rotation in the equatorial regions draws internal lines of magnetic force into a spiral magnetic field that encircles the sun in opposite directions in its northern and southern hemispheres, creating local instabilities.

Ultimately these reach the surface, and sunspots, flares and other solar phenomena appear. At a later stage, powerful electromagnetic field lines may loop high into the solar atmosphere, sometimes passing out into interplanetary space in the direction of the earth.

After about 11 years, according to Dr. Babcock's theory, the material of the sun's equator rotates so far ahead of the other material that the field lines are again brought into the starting configuration, but now with reversed magnetic polarity. This accounts for the 22-year solar magnetic cycle, which is made up of two 11-year sunspot cycles.

The magnetic nature of sunspots was discovered by Dr. George E. Hale, first director of Mt. Wilson Observatory, in 1908, but before Dr. Babcock's work no acceptable theory had been developed that satisfactorily accounted for the sunspot cycle.

Dr. Babcock also discovered after a year's observation the strongest magnetic field yet observed in the universe, a positive 35,700 gauss in star HD215441.

• Science News Letter, 80:411 December 23, 1961

Star Compositions Differ

Many stars have chemical compositions that differ widely from those of nearby stars. Observations during the past year at Mt. Wilson and Palomar by Drs. J. Jugaku and W. L. W. Sargent showed that one star, 3 Centauri A, had four times the iron, five times the nitrogen, 100 times the phosphorus, 1,000 times the krypton, and 10,000 times the gallium of other stars in the vicinity. Distances in the universe based on brightness of stars may need to be revised as they have been determined on the assumption that stars of the same class shine alike. Discovery of different chemical composition among the stars may alter this assumption.

• Science News Letter, 80:411 December 23, 1961

Life on Other Planets

Two opinions on the possibility of life on other planets are reported. Upon Mars there exist organic molecules of living origin, Dr. W. M. Sinton of the Lowell Observatory, working at Palomar, concluded from infrared reflection spectrum of Mars. Dr. Philip H. Abelson, director of the Geophysical Laboratory, surveying planetary environments concluded that not only is there no earth-like life on the moon, Venus or Mars but these heavenly bodies cannot be contaminated by organisms carried from the earth. This will reassure future astronauts who have been fearful of spreading earthly ills to the planets.

• Science News Letter, 80:411 December 23, 1961

Earth's Crust Explored

Deep in the earth's crust there are scattered large islands or lumps of rocks differing from those around them. This was suggested by seismic observations by the Department of Terrestrial Magnetism.

Temperatures beneath the continents vary widely from place to place, Dr. S. P. Clark Jr. of the Geophysical Laboratory concluded from measurements of heat flow from inside the earth.

• Science News Letter, 80:411 December 23, 1961

Scientific Revolution

➤ SCIENTIFIC revolutions of the future will come with lightning speed as a part of total social revolution in developing new countries, Dr. Caryl P. Haskins, president of the Carnegie Institution of Washington, declared in his annual report.

"When scientific revolutions come, they come as integral and delicately balanced parts of total social revolutions," Dr. Haskins said. "The conditions for them will have been maturing for many years. Unconsciously, inchoately, continuously, there has been adjustment over a protracted period, a long approach to some critical and fateful balance. And so, when such a revolution finally occurs, it is likely to come with lightning speed."

When this happens, action must be taken and critical decisions made very quickly, he emphasized, explaining:

"All too soon, for good or ill, a pattern may become firmly set. In this brief, flexible, tempestuous, and highly vulnerable period, a new nation may write its future indelibly. In such a time wisdom in planning is priceless. So also is wisdom, as well as speed and decisiveness, in action. Once critical steps are called for, there is not long to act, and afterward it may forever be too late."

"The most significant period of a scientific revolution comes, not when science is first apprehended by a gifted few," Dr. Haskins said, "but at the moment when the vision that has already compelled them spreads to a whole people."

• Science News Letter, 80:411 December 23, 1961

GENERAL SCIENCE

Families Living in Polar Homes Within 10 Years

➤ FAMILIES will be living permanently at weather stations in Antarctica within ten years, Dr. Paul A. Siple, scientific adviser to the U.S. Army Research Office, reported.

The present "artificial situation" of pioneering by men only could not remain long. "Husband and wife teams will soon be working as a family unit in Antarctica," he said.

"However, full scale colonization of Antarctica is a long way off. People there will be dependent on the outside world for food supplies. Science is the most important thing we can take out of Antarctica at present," Dr. Siple said.

• Science News Letter, 80:411 December 23, 1961

NUCLEAR FUEL ELEMENTS—A General Electric technician checks dimensional tolerances on one of the nuclear fuel elements recently fabricated at San Jose, Calif., for Pacific Gas & Electric Company's $20 million Humboldt Bay Power Plant nuclear unit. Each element, consisting of 49 individual stainless-steel fuel rods, contains about 200 pounds of uranium.

PUBLIC SAFETY

Nuclear Cities Coming

➤ CITIES ABLE to withstand a nuclear attack and function afterwards can and will be built, Dr. F. W. Edmondson of Cornell University predicted.

One such "fantastic" city he described as follows:

"Call this one NEUS. It's actually the executive center for northeastern United States. NEUS is a great governmental core city surrounded by its commercial, industrial and residential centers such as New York, Boston, Buffalo.

"It serves the region—Atlantic Coast to Alleghenies—Canada to Blue Ridge. Population of 150,000 persons staff NEUS and they represent all strata of government in the region.

"Within the city are all of the management techniques and scientific tools for effective administration. It is a compact city. There is no reason to scar the Hudson Valley.

"It covers only a few hundred acres, ousting one good size dairy farm, but it is massive, completely enclosed, a controlled environment. It has a high specific gravity since one-third of the city is underground.

"This city is nearly autonomous. Power source is nuclear—self contained. Communication is by microwave via the grandson of Echo I. Transportation is VTOL airborne mass transit.

"Man spends only a few hours daily in NEUS, but these are effective ones. Executive decisions are easily made by the help of 'information technology' equipment and staff.

"Light and air are perfectly controlled, even to balanced ionization. Solid wastes are chemically disposed and liquids are purified and recirculated.

"Expendable items, food, etc., are stocked at 25-year intervals. The underground portions are protective in design, insulated from transmitted shock, hardened against overpressures and screened against all nuclear, chemical and bacterial assault.

"Only a gleam in the eye of a visionary professor? Not quite, since this is the published intent of a group of hardheaded businessmen for a chosen site in the Hudson Valley."

Cities such as this will be built, Dr. Edmondson told the Building Research Institute's conference on design for the nuclear age in Washington. The abilities to build them are available, he said, and only the natural time lag between developed sciences and evolved city exists.

Dr. Edmondson charged that old cities have been "on the firing line too long. Born by geography but grown by the technology of Eli Whitney, they are reacting weakly to the surgical concept of renewal.

"The prognosis is poor. The old arteries are collapsed, the organs of social and mechanical functions are diseased and intravenous feeding of Federal, State, and private finance simply extends disability payments for a few more years. . . .

"Research, science, technology, this intermixture of effort that I will call science, together with management techniques, will breed these new cities," Dr. Edmondson predicted.

• Science News Letter, 80:412 December 23, 1961

BIOCHEMISTRY

Irradiated Wax Models

➤ YELLOW WAX models of human heads and other body parts that change color dramatically to red when exposed to radiation are helping doctors in Boston determine the radiation dose patients receive in treatment.

The chemically treated paraffin wax offers some "completely new possibilities" in radiation detection and measurement, Drs. Majic S. Potsaid of Harvard Medical School and Goro Irie of Massachusetts General Hospital say. Common chloroform is one of the chemicals used with the paraffin wax to make the models or to coat film. The dye used is dimethylaminoazobenzene, methyl yellow.

A bright yellow model changes immediately to red in the irradiated parts of the dosimeter, the physicians report in the New England Journal of Medicine, 265:1135, 1961. No further technical steps, such as developing or fixing, are required.

The chemically treated wax closely simulates the reactions of living tissues, and can be formed into any desired shape. The models so formed then show dramatic color changes indicating the exact path of the radiation to which they are exposed.

If the color changes are recorded on movie film, they can be even more effectively studied, the doctors found. The solid organic chemical detector has uses in radiation therapy, radiobiology, radiochemistry and radiology research in general, as well as in diagnosis by radiation.

By illustrating how chemicals can modify the effects of radiation, using the models holds promise for the possibility that such chemicals might aid in treating humans.

• Science News Letter, 80:412 December 23, 1961

MEDICINE

Emotional Disturbances May Mask Physical Ills

➤ SERIOUS ORGANIC diseases may hide behind a mask of emotional disorder, Dr. William B. Abrams, clinical director of pharmacology, Beth Israel Hospital, Newark, N.J., told the sixth Hahnemann symposium on psychosomatic medicine in Philadelphia.

The internist has a responsibility to make a thorough diagnosis of possible organic disorders before a patient is sent to a psychiatrist, Dr. Abrams said. Certain hormone disorders, for example, may masquerade as emotional disturbances, along with tumors, infections, circulation changes and other ailments.

If properly treated, the physical disorders along with the emotional manifestations may clear up without psychiatric help, he pointed out. Insomnia, tremors and depression are some symptoms that can hide physical illness.

• Science News Letter, 80:412 December 23, 1961

SCIENCE NEWS LETTER
VOL. 80 DECEMBER 23, 1961 NO. 26

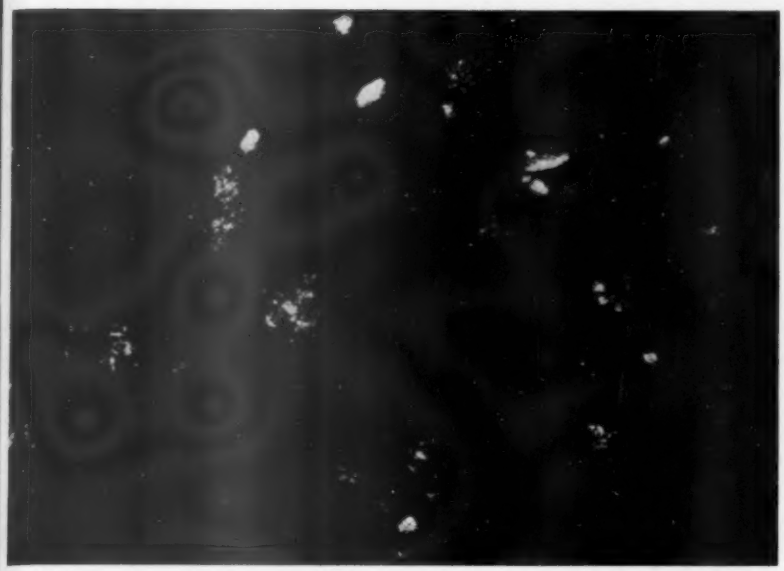
Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N. St., N.W., Washington 6, D. C., NOrth 7-2255. Cable Address: SCIENSERVC.

Subscription rates: 1 yr., $5.50; 2 yrs., $10.00; 3 yrs., $14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

Change of address: Three weeks notice is required. When ordering a change please state exactly how magazine is addressed. Your new address should include postal zone number if you have one.

Printed in U.S.A. Second class postage paid at Washington, D. C. Established in mimeograph form March 13, 1922. Title registered as trademark, U. S. and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineerng Index. Member of Audit Bureau of Circulation.



STISHOVITE CRYSTALS—Tiny crystals as seen under a microscope in polarized light, magnified 110 times. The crystals were concentrated from sandstone by adding hydrofluoric acid.

GEOLOGY

New Mineral Discovered

➤ ANOTHER new mineral formed when a huge meteorite struck the earth has been discovered in Meteor Crater, Ariz.

The mineral, known as stishovite, was created when an intense shock wave generated by the meteoric impact hurtled through the earth's layers. Stishovite is the second new meteoritic-impact mineral discovered in the crater where coesite was found a little more than a year ago by a group of U. S. Geological Survey scientists.

A high pressure shock wave exerting a force probably greater than 1,500,000 pounds per square inch pushed through the surrounding rock, changing embedded quartz grains into the new mineral. The pressure needed to form the new mineral, almost as dense as metal, was equivalent to pressures found a few hundred miles below the earth's surface.

The mineral was discovered in rock samples from Meteor Crater debris by Dr. E. C. T. Chao, Joseph J. Fahey, Janet Littler and Dr. Daniel J. Milton. These scientists belong to the Survey's astrogeologic unit that also discovered natural coesite.

"The discovery of either coesite or stishovite in a crater definitely establishes the crater as being meteoritic in origin and not volcanic," Dr. Chao said. There has been considerable debate among scientists both here and abroad whether certain deep craters in Germany, Africa and the United States were gouged out by a meteorite or formed by a volcano.

Stishovite was synthesized artificially earlier this year by Russian scientists S. N. Stishov, for whom the mineral was named, and S. V. Popova at Moscow State University's Institute of High Pressure Physics.

• Science News Letter, 80:413 December 23, 1961

METEOROLOGY

Center for Research On Atmosphere Opened

➤ A NEW NATIONAL laboratory to probe basic weather processes and other kinds of atmospheric behavior has been established in Boulder, Colo.

Known as the National Center for Atmospheric Research, or NCAR, the laboratory will be run by a 14-university corporation under the sponsorship of the National Science Foundation. The Center was established as a result of a report to the National Academy of Sciences calling for a major national effort in the atmospheric sciences.

This report urged that the national center tackle problems involving amounts of manpower and facilities beyond the capacity of individual universities to support.

The legal proceedings on Dec. 13 also marked the merger of the High Altitude Observatory, which has operated solar and astrophysical research facilities in Boulder and Climax for the past 15 years, with the university corporation. Dr. Walter Orr Roberts, director of the High Altitude Observatory since it was founded, was appointed director of the new National Center in June, 1960.

Among the practical applications to which the basic research of NCAR may lead are improved methods of weather prediction over both short and long periods, and a realistic assessment of the potentialities of weather control on local, regional and continental scales.

The NCAR scientific mission includes not only the study of the earth's atmosphere but also the influences on it from the underlying ground and ocean surface, and from the sun and cosmic sources.

Universities that are members of the corporation running NCAR include: Arizona, California, Chicago, Cornell, Florida State, Johns Hopkins, Massachusetts Institute of Technology, Michigan, New York, Pennsylvania State, Saint Louis, Texas A and M College Systems, Washington and Wisconsin.

• Science News Letter, 80:413 December 23, 1961

PUBLIC SAFETY

CD Official Supports "Do-It-Yourself" Shelters

➤ THE GOVERNMENT has endorsed low-cost, self-built fallout shelters and may examine some proposed plans, including the $36, four-by-six-foot "family" shelter designed and built by Dr. Willard F. Libby, Nobel prize winner and former member of the Atomic Energy Commission.

"We are in sympathy with very low cost 'do-it-yourself' shelters," Steuart L. Pittman, Assistant Defense Secretary for Civil Defense, reported. He said he had not yet examined the type of shelter proposed by Dr. Libby, but the Department of Civil Defense is preparing an instruction booklet that will make it possible for people with backyards and basements to build an adequate shelter for $150.

Civil Defense officials now estimate that in the event of an attack, persons would have to remain in fallout shelters for two weeks.

When asked how a family of four could survive for that period in such economy-sized shelters as proposed by Dr. Libby, Mr. Pittman said confinement studies are being made.

He favors dual-purpose shelters that can either be converted to other uses in later years or serve both for survival and some other function now.

Sec. Pittman said that survival is both probable and possible in the event of a thermonuclear war. He admitted that it is logical to assume that the enemy in an attack would aim for complete and total destruction of the United States, but he insisted that there was some logic to estimates that attack would be more limited. When questioned further, he declined to reveal this latter logic.

He recommended that every person, including apartment dwellers, should have a plan for what he does and where he goes in a thermonuclear attack. This preparation includes stocking food and "having it ready when you go."

In the event of an attack, Mr. Pittman said it is "quite possible that half of the shelters would be wiped out."

• Science News Letter, 80:413 December 23, 1961

SPACE

Search for Civilizations

➤ A THOROUGH SEARCH to detect radio signals sent out by civilizations on other planets should be made. The search should start as soon as possible and be given all possible support.

These are the conclusions of a German astronomer, Sebastian von Hoerner, who was affiliated with the National Radio Astronomy Observatory, Green Bank, W. Va., where astronomers listened for but did not find intelligent radio signals from other worlds. Mr. von Hoerner is a staff member of the Astronomisches Rechen-Institut, Heidelberg, Germany.

The search for other civilizations will have either a "tremendous result or none at all," he concluded after a careful study of the problem.

To be prepared in case signals are never detected, Mr. von Hoerner recommends that the receiving antenna to be used for the search also be usable for ordinary radio astronomy as well. This is because the size and sensitivity needed for the search antenna will make it "extremely powerful." Observing time should be divided between the two projects.

Mr. von Hoerner warns that his studies of the chances of detecting intelligent radio signals from space show that the waiting time for answers will be very long, perhaps as long as 1,000 years.

The radio signals, if found, could be one of three types, Mr. von Hoerner reports in Science, 134:1839, 1961. They could be local broadcasts, such as those used on earth for radio programs; long-distance calls, communication with established partners over interstellar distances; and contacting signals, radio waves broadcast with the specific intent to attract the attention of unknown future partners.

Although local broadcasts have the highest likelihood of existing, they would be very difficult to detect because the signals would be so weak. Long-distance calls would be detected only by chance. Since contacting signals would be intended for exactly the kind of search Mr. von Hoerner and other astronomers are recommending, they would have the highest probability of detection.

Concerning the wavelength to be used in the search or in broadcasting contacting signals from earth, Mr. von Hoerner suggests using exactly double the 21-centimeter radiation emitted by hydrogen. The 21-centimeter line is a "milestone" in the radio waves range since it is that of hydrogen in space and the universe consists mainly of hydrogen. Use of the 21-centimeter line was first suggested by Drs. G. Cocconi and Philip Morrison of Cornell University, Ithaca, N.Y.

Since intelligent signals superimposed on this hydrogen line might be hard to detect because they would be weak compared to the hydrogen radiation, Mr. von Hoerner recommends the 42-centimeter line.

The search should be guided by two estimates, one concerning the probable nature of such signals and the other the distance from which they might come. Mr. von Hoerner's studies were concerned mostly with the distance, but he also noted the problem of "feedback."

Supposing that a real exchange of ideas with other civilizations is possible, then interest would be kept alive over a very long period and might even lead to civilizations helping one another to solve problems. However, if the search for signals is unsuccessful, loss of interest would come soon.

• Science News Letter, 80:414 December 23, 1961

INVENTION

60 Years of Wireless

➤ SIXTY YEARS AGO, on Dec. 12, 1901, Guglielmo Marconi became the first man to receive a wireless signal across the Atlantic. This remarkable achievement with very primitive equipment marked the birth of world-wide communication.

During the spring of 1900, Marconi had succeeded in sending reliable signals from the Isle of Wight in the English Channel to Cornwall, England, a distance of 186 miles. This encouraged his belief that by using larger aerials and far more powerful transmitters he would be able to achieve transatlantic distances. Scientists were highly skeptical and many said it was impossible because of the curvature of the earth.

Marconi determined to make the attempt. A transmitting station nearly 100 times more powerful than any previously constructed was built at Poldhu, near Mullion, in Cornwall. Enormous aerials were erected at Poldhu and at Cape Cod, Mass., each consisting of 20 masts 200 feet high, but both were wrecked in severe gales.

Another, less ambitious in design, was put up at Poldhu while Marconi and his two assistants sailed to Newfoundland where, from the top of Signal Hill, near St. Johns, a receiving aerial was hoisted, at the third attempt, by means of a kite flying at a height of 400 feet.

At 12:30 p.m. (Newfoundland time) on Dec. 12, 1901, Marconi and his assistant G. S. Kemp, using one of the primitive receivers of the period with a telephone earpiece, heard a faint succession of S's in Morse code. Signals from Poldhu, 2,200 miles away, had crossed the Atlantic.

The feat was all the more remarkable when it is remembered that the onus was almost entirely on the transmitter, for no amplification was possible at the receiver, and so the received signal itself had to be strong enough to operate the earpiece.

A year later, in December 1902, two-way communication was effected between Poldhu and a new high-power transmitting station at Glace Bay, Canada. The Canadian Government gave $80,000 towards the cost of the station.

A special exhibition is being held at the Science Museum, London, from Dec. 13 to Jan. 25. Visitors will hear a recording of Marconi's voice telling in his own words of how success was achieved.

• Science News Letter, 80:414 December 23, 1961

GENERAL SCIENCE

Grants of $26.4 Million To 475 Summer Institutes

➤ NEXT SUMMER the National Science Foundation will aid about 20,500 high school and 2,000 college teachers of science, mathematics, and engineering to return to school for a new view of the subject matter they teach.

Grants totaling approximately $26.4 million to 274 colleges and universities were announced in support of 475 institutes in 1962 as part of the effort of the Foundation to aid the ability and increase the classroom effectiveness of teachers.

Summer institutes offer teachers study opportunities in specially designed courses to 1. renew their knowledge of fundamentals, 2. acquaint them with recent developments and advancements in science, mathematics and engineering, and 3. familiarize them with new approaches in the presentation of subject matter.

Generally, a summer institute accepts about 50 applicants for sessions usually lasting six or eight weeks. Institutes offer intensive courses with lectures, demonstrations, discussion sessions, laboratory work, and homework. The instruction is given by the college or university faculty of the host institution sometimes assisted by visiting scientists serving as short term lecturers or as full time staff members.

An important part of each institute is the opportunity for teachers to work closely with the university staff, scientists, and teachers in both formal and informal sessions and to discuss common problems. Teachers live on-campus in groups, often with members of the staff, and usually share dining facilities.

Tuition and fees are paid for teachers attending institutes. Teachers receive stipends of not more than $75 a week for the duration of the training, allowances for travel, and allotments for dependents up to four in number.

Nearly 165 of the summer institutes in 1962 will offer courses in multiple fields. Another 118 institutes will be in mathematics, 53 in biology, 39 in chemistry, and 23 in physics. Other institutes offered in cooperation with the Atomic Energy Commission will specialize in radiation in the physical sciences, radiation biology, and isotope technology.

• Science News Letter, 80:414 December 23, 1961

SPACE

Rocket Reactor Tested

➤ A NEW nuclear reactor model designed for model space rockets, the Kiwi B-1-A, has been tested on the ground. Six more B-models will be tried before an atomic rocket will be launched.

The Kiwis are named for a non-flying Australian bird because the nuclear rocket using the Kiwi reactors will never "fly" as a first stage booster lifting the rocket off the ground.

However, the Nerva nuclear rocket engine powered by a Kiwi reactor may be used on advanced Saturn rocket models as second or third stages for manned mission flights to the moon and the planets Venus or Mars.

The nuclear rockets will have great advantage over chemical rockets because they can boost heavier loads farther with less fuel than chemical rockets now used.

The National Aeronautics and Space Administration reported in Washington, D. C., that the tests took place at Jackass Flats, an Atomic Energy Commission test site about 120 miles from Las Vegas, Nev. The Kiwi reactor has been developed at the Los Alamos Scientific Laboratory, N. Mex., operated by the University of California. The Kiwi reactors are part of the joint National Aeronautics and Space Administration and AEC Project Rover, an upper-stage nuclear rocket program.

Tests of the Kiwi B-1-A, originally begun in November, were abruptly brought to an end Nov. 7 by a hydrogen gas explosion. The reactor uses gaseous hydrogen as a propellant. However, no radioactivity was involved at the time, NASA reported. The Kiwi B-1-A model is the fourth nuclear reactor tested for the Rover project. The three earlier ones were simpler "breadboard" models of the A series, under development since 1959 and forerunners for the new B-series.

When the B-models have been tested, 30 to 40 of the final reactor model will be ordered for testing in the Nerva engine. Each reactor will be used only once.

The upper stage nuclear rocket is expected to be about 40 feet high and 27 feet in diameter. It could be ready for test flights in 1966 or 1967, but no mission flights are likely until one to two years after that.

• Science News Letter, 80:415 December 23, 1961

CHEMISTRY

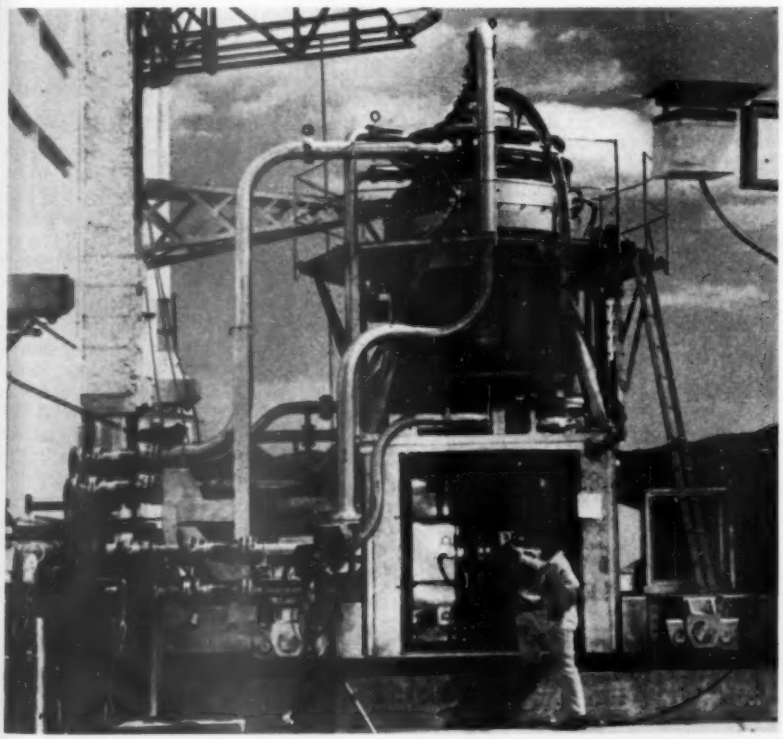
Fluidized Petroleum Coke Looks Like Snow

See Front Cover

➤ WHAT APPEARS to be Christmas snow flakes on the front cover is really a photomicrograph of fluidized petroleum coke.

General Electric Company scientists at the Hanford, Richland, Wash., plant magnified the "flakes" as part of the study of raw materials to be used in an atomic reactor.

• Science News Letter, 80:415 December 23, 1961



NUCLEAR POWER FOR ROCKETS—Residual radioactivity count is made after a low power test of a Kiwi-A Prime, one of the atomic reactors developed to study the feasibility of nuclear rocket propulsion.

NUTRITION

Less Time in Kitchen Foreseen for Future

➤ THE WOMAN in the house will spend less time in the kitchen in the future, the Nutrition Foundation predicts.

This will be due to increased use of what the food people call "convenience" or prepared food. More use of pre-cooked whole meals is also foreseen.

The Nutrition Foundation, an organization of food manufacturers, distributors and companies in related industries, also joined the national drive for weight control.

The average American adult is 15 pounds overweight, the Nutrition Foundation warns. The organization predicts that in the future:

"More adults will cease thinking of food solely in terms of calorie-counting, and eat, in moderation, for enjoyment and to provide abundant energy and good health. Successful weight control comes through changing one's food habits, and keeping food intake in balance with the energy output."

Celebrating its 20th anniversary, the Nutrition Foundation gave citations to: Dr. George W. Beadle, chancellor, University of Chicago; Dr. Vincent du Vigneaud, professor of biochemistry, Cornell University Medical College; Dr. Conrad A. Elvehjem, president, University of Wisconsin; Dr. William C. Rose, professor of biochemistry emeritus, University of Illinois; Dr. Fredrick J. Stare, professor of nutrition, Harvard School of Public Health.

• Science News Letter, 80:415 December 23, 1961

MINING

Greater Protection For Coal Miners Sought

➤ NEW STANDARDS for testing and approving automatic "methane-monitoring systems" for use in underground coal mines have been proposed by the Bureau of Mines to provide greater safety for the miners.

The "monitoring" system, important in today's highly mechanized coal mines, detects concentrations of methane gas before they build up to potentially explosive and dangerous proportions.

Workers are warned if methane accumulates, and all electrically powered equipment in the affected part of the mine is automatically shut off.

The proposed standards were developed through laboratory and field experiments, including actual mining trials.

• Science News Letter, 80:415 December 23, 1961

GEOGRAPHY

South Pole Discovered Fifty Years Ago

➤ A HALF CENTURY ago Roald Amundsen, one of Norway's great explorers, stood on a wind-swept plateau of Antarctic ice and through astronomical calculations determined he was the first to reach earth's southernmost extremity. That was on Dec. 14, 1911.

Today the South Pole is inhabited for at least part of the year. An international celebration in honor of the Amundsen discovery was held there Oct. 30 when representatives of the United States, Norway, Great Britain and New Zealand were landed by navy ski-plane. Flags were raised, and plaques were dedicated in honor of the South Pole discovery.

Capt. Robert Falcon Scott, British explorer, discovered the South Pole independently on Jan. 18, 1912, a little more than a month after Amundsen's arrival. Scott and his party all perished on their return journey.

Historic record of the South Pole discovery shows that Roald Amundsen set out from his base at Framheim at about 77½ degrees south in the Bay of Whales on Oct. 18, 1911, together with Olav Bjaaland, Helmer Hanssen, Sverre Hassel and Oscar Wisting. They went straight south, and reached the Pole area on Dec. 14, encircling the Pole during the following two days and returning to their base on Jan. 26, 1912. Scott, starting from Ross Island at about 77½ degrees south, a fortnight later than Amundsen, reached the Pole together with E. A. Wilson, H. R. Bowers, L. E. G. Oates, and E. Evans, on Jan. 18, 1912.

• Science News Letter, 80:416 December 23, 1961

PUBLIC HEALTH

Pregnant Women Not Hurt by X-rays

➤ PREGNANT WOMEN are not harmed by X-rays. A study of 8,000 women and their 40,000 children over a 15-year period in England and Scotland showed no genetic harm or resulting leukemia following X-ray during the mothers' pregnancy.

Prof. Sir Austin Bradford-Hill of the London School of Hygiene and Tropical Medicine, London, England, said at the National Naval Medical Center, Bethesda, Md., that the hazards of X-rays during pregnancy have apparently been overestimated.

Women who had been X-rayed in eight large hospitals—four in London and four in Edinburgh, Scotland—were studied in the follow-up.

A second follow-up study was made of 433 women who had worked three years with luminous watch dials coated with radium. Here, too, no adverse effects were seen although the women had painted the dials with no special protection from radium.

A third study still in progress shows that "appreciable amounts" of radiation are reaching the gonads (sex glands) from mass X-ray studies where people are lined up routinely.

Physicists are being sent to clinics and hospitals to measure the radiation dosage being received by patients. They have found that when patients are lined up, a considerable amount of radiation is received not only by the patient being X-rayed but also by the patient standing behind him.

Recommendations are for using the smallest necessary amount of radiation. X-rays are preferred to fluoroscopy since the fluoroscope affects a larger area. X-rays should be "coned down" to the actual area of a fracture, for example, so they do not affect the entire extremity. Operators and all in the vicinity of X-rays should be protected, the investigators advise.

Since radiation damage may not appear in the first generation, Sir Austin's studies will continue during a long period.

• Science News Letter, 80:416 December 23, 1961

TECHNOLOGY

Rear Lighting System Increases Auto Safety

➤ AMERICAN automobiles will have a new safety feature when rear turn and stop signal lights that are brighter in daylight hours, but lower in brightness at night, are installed.

This "dual intensity" system will increase the daylight brightness of the signals two to four times, but the brightness will be lowered automatically when headlights are turned on, reducing glare for the drivers of the cars behind.

The Automotive Manufacturers' Association intends to adopt the system, but has set no date. Extensive changes will be required in automotive electrical circuits. Engineers at Westinghouse Electric Corporation, Bloomfield, N. J., have devised a two-filament light bulb and a lighting fixture that prevents use of the wrong bulb in a dual intensity installation.

• Science News Letter, 80:416 December 23, 1961

MEDICINE

World's Largest Medical Library Dedicated

➤ THE WORLD'S largest medical library has been dedicated as a unit of the immense medical research complex at Bethesda, Md. The new building will cost $7,300,000 completely furnished.

The National Library of Medicine, containing more than a million books, will serve as a storehouse of medical knowledge dating back to the early days of medicine. The library was formerly housed in an old building in Washington, D.C., that was shared with the Army Medical Museum.

The building is on five levels occupying an area of 231,560 square feet.

However, there will be room for only 1,120,000 books, and at the present rate of increase an addition will probably have to be built in about ten years.

• Science News Letter, 80:416 December 23, 1961

IN SCIEN

ANIMAL HUSBANDRY

Pigs Have Ulcers; Due to Tension?

➤ ULCERS in pigs have become a serious problem and they may be caused by the fast pace of life that today's pigs lead.

Prof. R. G. Grummer, chairman of the University of Wisconsin's animal husbandry department, reports that a four-year study under a National Institute of Health grant is underway to determine if a pig's ulcers are similar to ulcers in people. Dr. Tadeusz Kowalszyk, university associate professor of veterinary science, who will head the study, believes there is a relationship, pointing out that pigs, like people, eat everything.

Modern pigs are kept in confinement, and this may become a source of tension that causes ulcers. Although no cure has been found, it is possible that pigs would respond to a diet rich in cream, just as people do.

• Science News Letter, 80:416 December 23, 1961

PHYSIOLOGY

Complex Brain Selection Of Impulses Studied

➤ THE WAY in which the brain selects specific impulses from the shower of impulses coming from all parts of the body is being studied at the University of California, Los Angeles.

According to Dr. Mary A. B. Brazier of UCLA's Brain Research Institute, there is increasing interest in the theory that the brain does this on a probabilistic basis.

This means that the brain may assess the probability that a message is important enough to be acted on by matching it against messages it has already experienced.

Hundreds of nerves are constantly bringing myriads of impulses to the brain indicating which sense organs are being stimulated and how intensely they are being stimulated, Dr. Brazier points out.

There are other, far more subtle shades of sensation, such as the hue of a color, the pitch of a sound and the pattern of a Braille word. Some nerves even deliver impulses without outside stimulation.

The questions the brain must answer in an instant are which messages are more significant and which can be safely ignored.

Dr. Brazier has studied these brain processes by averaging the brain's electrical activity in man and animals by various computer methods. Computer data analysis supports the idea that the brain matches incoming messages against its continuous activity, which incorporates previous experience.

Any marked deviation from the profile of this activity carries sufficient information to cause the brain to act.

• Science News Letter, 80:416 December 23, 1961

E FIELDS

MEDICINE

Clue Seen to Cause of Kidney Cancer in Man

➤ A CLUE to one of the causes of kidney cancer in man is reported by a London pathologist working on the cancer-causing properties of lead compounds in laboratory animals.

So far the cause of kidney cancer in man is unknown, but Dr. Cuthbert E. Dukes, a consultant at St. Mark's Hospital, London, reports in The Lancet that new avenues of research are opening up.

For the past two years Dr. Dukes has been doing research at the Chester Beatty Research Institute in London, where lead acetate has been fed to rats with resulting kidney cancer.

"It may be found that other chemicals, when added to the food of susceptible animals, will eventually result in the production of renal tumors and so provide a clue to one of the causes of cancer of the kidney in man," Dr. Dukes said.

Other clues to the cause of kidney cancer, he believes, may lie in research on occupational hazards such as handling dyes and chemicals. Viruses and female hormones are other agents that have produced kidney cancer in laboratory animals.

• Science News Letter, 80:417 December 23, 1961

TECHNOLOGY

Computers Can Assist Practicing Physicians

➤ THE TIME is coming when practicing physicians will be able to dial a telephone and obtain a wide variety of medical information from a computer, a California psychologist predicted.

Dr. Robert W. Harrington, manager, biomedical systems department, Systems Development Corporation, Santa Monica, Calif., told a preliminary meeting of the 1961 Eastern Joint Computer Conference in Washington, D. C., that a computer system in hospitals would not only be economically feasible but would be an absolute necessity.

Computers are especially valuable in providing quick information on patients with long-term chronic diseases, Dr. Harrington said.

"We have pretty well licked the acute diseases with modern drugs," he said, "but the volumes of data about the chronically ill patient need to be made less cumbersome and time-consuming."

Dr. Harrington said computers could be used to reduce admission procedures, get information quickly to wards when needed, and store temperature, pulse and respiration records so they could be easily retrieved.

"It may be possible to develop norms for individuals so corrective trends may be taken before the time of treatment," he explained.

Automated pharmacies and laboratories may lie in the near future, and computers may soon aid in medical education, the psychologist said. However, he added that no computer can do research.

"Computers have the power of contributing new tools to the field of medicine and can advance the power of existing techniques," he said.

• Science News Letter, 80:417 December 23, 1961

MEDICINE

Shock and Poisoning Treated by Two Drugs

➤ TWO PROMISING drugs, one for treating shock, the other for barbiturate poisoning, are reported in the Journal of the American Medical Association, 178:994, 1961.

Physicians will be reading in the official magazine that angiotensin II is the most effective agent now available to return blood pressure to normal levels in cases of shock.

The blood pressure returned to normal in 15 patients treated with intravenous injections of this drug by Drs. Francesco del Greco, and David C. Johnson of Northwestern University Medical School and Passavant Memorial Hospital, Chicago.

An increased output of urine (diuresis) by using tromethamine (THAM) was successful in combating drug poisoning, Drs. Reuben C. Balagot, Hideo Tsuji and Max S. Sadove of the University of Illinois' department of surgery, Chicago, report (p. 1000).

Contact lenses should not be worn in heavy industry where there are particles in the air or any chemicals that might injure the eyes, Dr. Hedwig S. Kuhn, ophthalmologist of Hammond, Ind., replies to an inquiring reader (p. 1055).

A physician in Concord, Calif., asked the question as a result of injury to an engineer who wore safety goggles as well as contact lenses.

• Science News Letter, 80:417 December 23, 1961

ENTOMOLOGY

Lettuce Loopers Starve Themselves

➤ SCIENTISTS at the University of California's department of entomology, Davis, Calif., have developed a compound, "antifeeding compound 24055," that controls loopers (the larvae of geometrid moths) on lettuce by forcing them to starve themselves. Nontoxic to humans and beneficial insects, the chances are that future generations will not become resistant to the chemical.

It is believed that 24055 is an antimetabolite; that is, a compound that replaces its natural twin chemically, while not performing some particular function of the metabolism—in this case, eating.

The chemical has also proved effective against clothes moths, according to R. J. Pence of the University.

• Science News Letter, 80:417 December 23, 1961

PUBLIC HEALTH

High Altitudes of Tests Lessen Immediate Fallout

➤ PRESENT LOW LEVELS of fallout from Russian tests are probably due to the high altitudes reached by the Soviet nuclear explosions, Dr. Lester Machta, U.S. Weather Bureau expert, Washington, D. C., believes.

Present estimates are that debris from the Soviet bombs reached much higher into the troposphere than the debris from the United States and British tests in 1957 and 1958. This would explain, in part, why immediate fallout levels from the Western tests were much higher than that from the Soviet tests to date.

It is also possible as some observers have suggested that the Soviets may have developed a somewhat "cleaner" bomb. However, if the fission yield is similar to previous tests, the spring of 1962 will bring with its rains fallout that will double present levels.

Cloud seeding to direct or modify fallout distribution is impractical, Dr. Machta said. "The area contaminated with fallout particles is so huge that even if local removal were possible by cloud seeding, it would not significantly affect fallout in the rest of the atmosphere."

The principal potential hazard from fallout is the ingestion of radioactivity rather than external skin doses. At present, the only solution lies in avoiding contaminated food or water supplies rather than attempting to control existing atmospheric fallout.

• Science News Letter, 80:417 December 23, 1961

DERMATOLOGY

Soap and Water Needed For Facial Cleansing

➤ OLD-FASHIONED soap and water are still needed to cleanse the face, a dermatology professor told the American Academy of Dermatology meeting in Chicago.

A penalty for substituting creams, lotions and so-called skin foods for soap and water is often the enormous multiplication of a tiny mite that occurs normally in small numbers on the face of the adult human. The end result is a flushed and pimple-like or pustular face, Dr. Samuel Ayres Jr., of the University of California, Los Angeles, said.

Dr. Ayres reported that patients are usually women. The first thing they notice is a feeling of itchiness, dryness and roughness of the face. They wrongly conclude that their faces need more creams and less washing, which leads to a vicious cycle of still further encouraging the mites, the dermatologist explained.

The mite, known as *Demodex folliculorum*, usually lives a sedentary life. It feeds on the fatty material normally secreted by the oil glands, and produces no particular symptoms.

This skin condition usually disappears rapidly when daily washing with soap and water is resumed and a suitable antiparasitic medication is prescribed.

• Science News Letter, 80:417 December 23, 1961

ASTRONOMY

Brilliant Winter Stars Visible

The brilliant winter constellation Orion, shines in the southern sky on evenings during January. Jupiter is seen in the southwest soon after sunset, James Stokley reports.

➤ WITH THE APPEARANCE of the constellation Orion and his brilliant neighbors in the January evening sky, the absence of the naked-eye planets will hardly be noticed. At the beginning of January you may get a glimpse of Jupiter low in the southwest soon after sunset. It goes below the horizon long before the times for which the accompanying maps are drawn.

These show the skies as they look at 10:00 p.m., your own kind of standard time, on New Year's Day; an hour earlier in the middle of the month, and two hours earlier at the end.

Over in the southeast you can see the brightest of all the stars that appear in the nighttime sky: Sirius, the dog star, in Canis Major, the great dog. Sirius is several times as bright as any other star visible from most of the U.S. (except, of course, for the sun), but two stars seen from points farther south are more nearly equal to it.

Above Sirius, and a little to the right, stands Orion, generally considered as the finest constellation in the sky. It is one of two that contains more than one star of the first magnitude or brighter. The other is a southern group, Centaurus; like Orion, it has two.

Rigel Is Dimmed

One of the brighter stars in Orion, the lower, is Rigel, its light somewhat dimmed because of absorption by the atmosphere. Betelgeuse, higher and somewhat red in color, is the other. Between them you will see what is perhaps the most characteristic feature of Orion—the row of three stars that form the belt of this warrior. That is the way he was pictured on the old star maps, which showed the figures around the stars.

They depicted Orion with an upraised club, defending himself from a charging bull. This animal is represented in the sky by the next-door constellation of Taurus, a little higher than Orion and farther right. In it is the red star Aldebaran, which is one of the bull's eyes.

Canis Major was supposed to be one of Orion's two dogs; the other is Canis Minor —the lesser dog—above the large one and to the left. In it is another first magnitude star, called Procyon. Still higher is Gemini, the twins, with Castor and Pollux. However, only Pollux is bright enough to rate as first magnitude; Castor is second magnitude.

Extending upwards from Taurus is Auriga, the charioteer, with still another first magnitude star, called Capella. It appears on the map of the northern skies.

Over in the eastern sky stands the eighth and last of the first magnitude stars shown on these maps. This is Regulus, in Leo, the lion. Six of the stars in this figure outline a sickle, with Regulus, the lowest, at the end of the handle. Leo, like Gemini, is one of the 12 constellations of the zodiac, the band through which the sun, moon and planets seem to move around the sky.

Toward the northeast these evenings lies the familiar figure of the great dipper, likewise with the handle directed downwards. Above are the two stars called the pointers. Following their line to the left leads to Polaris, the pole star, which is always seen to the north. The dipper is actually part of Ursa Major, the great bear, while the pole star is in Ursa Minor, the lesser bear.

High in the northwest is Perseus, in which there is a famous variable star, Algol. Every few days it drops from second to third magnitude, as a faint star passes in front of the brighter member of the pair and partially eclipses it.

The reason that none of the naked-eye planets—Mercury, Venus, Mars, Jupiter or Saturn—is easily visible in January is that they are all nearly in the same direction as the sun. Thus, they rise about sunrise and set about sunset and are in the sky during the daylight hours, when the glare hides them. Later in the year, however, they will all come into prominence in the evening sky.

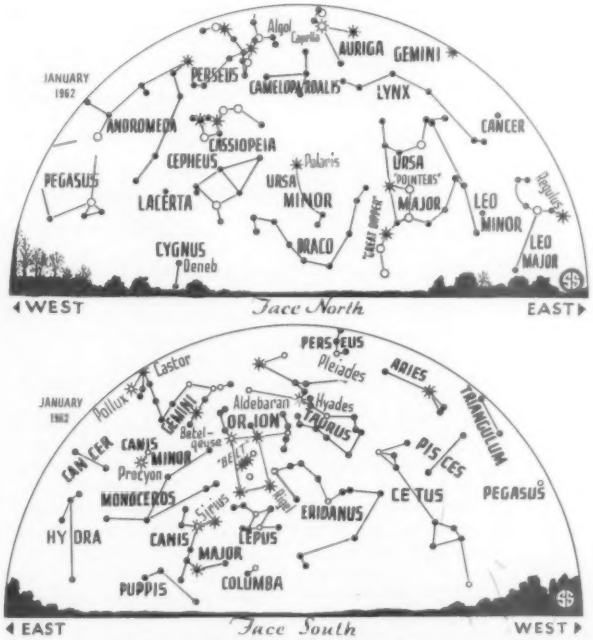
Mercury and Venus move around the sun in orbits that are smaller than earth's. Thus they may come approximately between us and the sun (inferior conjunction) or they may pass beyond the sun (superior conjunction).

At either conjunction they are invisible, because they are nearly in line with the sun. But prior to inferior conjunction they follow the sun in its apparent daily motion across the sky, and may remain long enough after sunset to be seen in the west. After the conjunction they are west of the sun, and may appear in the east before sunrise.

See Mercury East of the Sun

On Jan. 20 Mercury will be farthest east of the sun, and it may be seen then, very low in the southwest, after sundown as dusk gathers. However, it will not be easy to find. It will be in a similar position May 13, when it should be easier to see, and again on Sept. 10. Around March 3 it will be west of the sun and visible with difficulty in the morning sky. It will be similarly situated, though not as favorably, on July 1, and Oct. 21, which will be the most favorable elongation to observe.

Venus will be behind the sun Jan. 27 and after that will move toward the east of that orb. During the spring it will begin to shine brilliantly in the southwestern evening sky. On Sept. 3 it will be farthest east



of the sun, remaining in the sky for the longest time after sunset. On Oct. 8 it will be at greatest brilliance, with magnitude minus 4.3, which is about 15 times as bright as Sirius. Then it will quickly disappear, reaching inferior conjunction Nov. 12, but it will quickly reappear in the morning sky, as bright as it was before the conjunction.

Mars, Jupiter and Saturn move in orbits larger than the earth's, so they can never come to inferior conjunction. They are most conspicuous at opposition, when they are in the opposite direction from the sun. Mars was out beyond the sun, in conjunction with it, on Dec. 14. Now it is gradually coming into view in the morning sky, but not until spring will it be at all prominent. By the end of the year it will be conspicuous in the evening, with opposition on Feb. 4, 1963.

Jupiter is now out beyond the sun, with conjunction Feb. 8. By late spring it will move into the evening sky, opposition arriving Aug. 31. Saturn will be at conjunction on Jan. 22, with opposition July 31.

Thus, by next fall we will have a fine display of planets, with Venus, Mars, Jupiter and Saturn all visible.

The new year will also bring two eclipses of the sun. The first, on Feb. 4 and 5, is total. Along a belt crossing the Pacific Ocean, from New Guinea to a point about a thousand miles west of Lower California, the sun will be completely covered by the moon for as long as four minutes. Over a larger area, including the west coast of North America, a partial eclipse will be seen.

On July 31 there will be an annular eclipse. That is, the moon will come in front of the sun but will not cover it. A ring of the solar surface appears around the dark disc of the moon. This effect will be visible along a path from Brazil, crossing the South Atlantic, then traversing Africa and Madagascar. All of Africa, most of South America and Florida and Georgia in the U.S., will see a partial eclipse.

Celestial Time Table for January

January	EST	
2	7:04 p.m.	Algol at minimum
6	7:36 a.m.	New moon
7	8:00 a.m.	Moon passes Mercury and Saturn
8	3:00 a.m.	Moon passes Jupiter
	9:00 a.m.	Moon nearest; distance 225,400 miles
13	12:02 a.m.	Moon at first quarter
14	6:21 a.m.	Algol at minimum
17	3:11 a.m.	Algol at minimum
20	1:17 p.m.	Full moon
	7:00 p.m.	Mercury farthest east of sun
	midnight	Algol at minimum
22	1:00 p.m.	Saturn in conjunction with sun
	8:50 p.m.	Algol at minimum
24	8:00 a.m.	Moon farthest; distance 252,100 miles
25	5:39 p.m.	Algol at minimum
27	5:00 a.m.	Venus at superior conjunction with sun
28	6:37 p.m.	Moon in last quarter

Subtract one hour for CST, two hours for MST, and three hours for PST.

Know the Sky to Watch Satellites

These star maps showing the positions of stars and planets can help you locate satellites when they flash briefly across the sky. Familiarity with the constellations and their relative positions makes locating artificial moons much easier whenever they are visible from your area.

• Science News Letter, 80:418 December 23, 1961

MEDICINE

Mice Protected Against Cancer With TB Germs

➤ UNIVERSITY of California scientists have protected mice against five experimental cancers by injecting them with living and killed tuberculosis germs.

In various experiments, the bacterial preparations proved from 10% to 90% effective against later inoculations with the cancers. All the cancers used had originated recently and spontaneously in the strains of the animals tested.

Such cancers bear a closer resemblance to the development of clinical malignancies in man than to the growth of old, established laboratory lines of malignant cells, or of tumors produced artificially in animals by means of chemical agents.

These experiments were described in a report by Drs. David W. Weiss and Kenneth DeOme and Mrs. Rose Bonhag, of the Department of Bacteriology and the Cancer Research Genetics Laboratory.

The results of the research indicate that a single non-toxic agent can have at least some protective effect against several cancers of a different type, in animals which are the natural hosts of the cancers. Heretofore, it has been generally found that effective anti-tumor agents are either considerably toxic, or are rather limited to a particular type of tumor.

Various forms of extracts of tubercle bacilli were tested against cancers of mouse uterine connective tissue, liver and bone, and two types of breast cancer.

The various preparations were composed of living tuberculosis germs, germs killed with phenol, and killed germs extracted with acetone and other chemical solvents yielding various fractions.

All the preparations elicited some protection, but the degree of protection varied from tumor to tumor.

Dosage turned out to be a critical factor—too much or too little of any of the preparations brought poor protection. Small doses usually were best. The dead germs were as effective as living bacilli, and sometimes more so.

Tuberculosis germs mixed with other substances or given beforehand have long been known to improve the ability of many animals to respond subsequently to unrelated antigenic materials. They have also been found to raise considerably an animal's resistance to subsequent infection with other disease-causing germs. The mechanism of the resistance produced by tubercle bacilli against the cancers is not yet understood, but there is some suggestion that it might involve a similar stimulation of the immunological abilities of the animals.

The results point to the high possibility of some degree of cancer prevention if, as some contend, cancerous cells act as antigens for the animals in which they arise.

• Science News Letter, 80:419 December 23, 1961

• Books of the Week •

For the editorial information of our readers, books received for review are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C.

ADVANCES IN GENETICS, Vol. 10—E. W. Caspari and J. M. Thoday, Eds.—*Academic Press*, 429 p., illus., $10. Treats aspects of chromosome breakage, genetics of transformation and genetic assimilation, among other subjects.

ADVANCES IN GEOPHYSICS, Vol. 8—H. E. Landsberg and J. Van Mieghem, Eds.—*Academic Press*, 392 p., illus., $13. Covers indices of solar activity, ionospheric research by satellite, constant level balloon data, paleomagnetism and numerical prediction of storm surges.

BETWEEN EARTH AND SPACE—Clyde Orr, Jr. —*Collier Bks.*, 224 p., paper, 95¢. Nontechnical account of the atmosphere and its importance to man, reprint of 1959 edition.

CAPITAL PUNISHMENT: A World View—James Avery Joyce—*Nelson*, 288 p., $5. International lawyer presents history of capital punishment and gives worldwide survey of legal execution as it is practised today, concluding that capital punishment is no longer a valid "social defense."

THE COMPLETE PEACE CORPS GUIDE—Roy Hoopes, introd. by R. Sargent Shriver—*Dial Press*, 180 p., $3.50; paper, $1.95. To answer specific questions about the origins, aims and operations of the program.

ELECTRONIC COMPUTERS: Fundamentals, Systems and Applications—Paul von Handel, Ed. —*Prentice-Hall*, 235 p., illus., $13.50. Analysis of basic computer types, emphasizing principles and methods.

EXPERIMENTAL BIOLOGY FOR BOYS—Morris Goran—*Rider, J. F.*, 113 p., illus., $3.45. Beginner's book, introducing concepts of biology and methods of experimentation.

EXPERIMENTAL CHEMISTRY FOR BOYS—Morris Goran—*Rider, J. F.*, 120 p., illus., $3.45. Eighty experiments designed to show how to work with chemicals and how to solve problems the way scientists do.

EXPLORING THE METROPOLITAN COMMUNITY—John C. Bollens, Ed.—*Univ. of Calif. Press*, 492 p., illus., $7.50. Presents major findings and methods of a comprehensive series of governmental, social and economic studies of the St. Louis City-County area.

GAMES ANCIENT AND ORIENTAL AND HOW TO PLAY THEM—Edward Falkener—*Dover*, 366 p., illus., paper, $1.85. Reprint, classical scholar's reconstruction of ancient Egyptian, Greek, Roman and Oriental board games and living board games not known in the Western World.

HOW HELICOPTERS ARE MADE—David C. Cooke—*Dodd*, 64 p., photographs, $2.50. Shows boys the parts that go into the assembly of a helicopter.

INTRODUCTION TO ANIMAL VIROLOGY—A. P. Waterson—*Cambridge*, 96 p., illus., $4. Brief and authoritative account of recent trends in virus research, which has come to regard viruses as abnormal transmissible cell components rather than microbes, as a result of advances in technique.

INTRODUCTION TO SPACE DYNAMICS—William Tyrrell Thomson—*Wiley*, 317 p., diagrams, $11.50. Textbook develops mathematical procedures for such dynamic problems as motion in outer space, satellite orbits, gyrodynamics and space vehicle motion.

THE LAYMAN'S GUIDE TO PSYCHIATRY—James A. Brussel—*Barnes & Noble*, 235 p., paper, $1.50. Outline of modern psychiatric knowledge, mental illness and the role of psychiatry.

LET'S READ: A Linguistic Approach—Leonard Bloomfield and Clarence L. Barnhart—*Wayne State Univ. Press*, 470 p., $7.50. A scientific system of teaching reading based on the correlation of a sound image with its corresponding visual image, that is, with the spelling.

MATH WITHOUT NUMBERS—Edgar S. Bley—*Sterling*, 128 p., diagrams, $2.50. Attempts through simple forms to explain logical relationships in geometric principles and set theory.

MAZES AND LABYRINTHS: A Book of Puzzles —Walter Sheperd—*Dover*, rev. ed., 122 p., illus., paper, $1. Essay and 50 recreational mazes.

A NATURALIST IN ALASKA—Adolph Murie—*Devin-Adair*, 302 p., illus. by Olaus J. Murie, photographs by author and Charles J. Ott, $6.50. Concerns the domestic ways of grizzly bear, wolf, lynx, wolverine, Dall sheep, caribou and fox.

OBSERVATIONS ON PACIFIC CETACEANS OF CALIFORNIA AND MEXICAN WATERS—Kenneth S. Norris and John H. Prescott—*Univ. of Calif. Press*, 83 p., 41 plates, paper, $2.25. Monograph describes sightings, morphology and behavior of porpoises and whales on the Pacific coast.

ORGANIZATION, AUTOMATION AND SOCIETY: The Scientific Revolution in Industry—Robert A. Brady—*Univ. of Calif. Press*, 481 p., $8.50. Study concentrates on the given components of developments in industrial technology and focuses on the need to organize the productive resources of an economy in order to make full use of the potentialities of advances in science and technology.

PERCEVAL'S NARRATIVE: A Patient's Account of His Psychosis, 1830-1832—Gregory Bateson, Ed.—*Stanford Univ. Press*, 331 p., $6.75. Perceptive autobiographical account of a schizophrenic with insights that have relevance and importance for modern psychiatry.

PLANT HUNTERS IN THE ANDES—T. Harper Goodspeed—*Univ. of Calif. Press*, rev. 2nd ed., 378 p., photographs, maps, $7.50. Record of six University of California Botanical Garden Expeditions to Peru, Chile, Colombia, Bolivia, Argentina and Uruguay.

PROCEEDINGS OF THE TENTH PACIFIC NORTHWEST INDUSTRIAL WASTE CONFERENCE—Washington State Institute of Technology—*Wash. State Univ.*, 253 p., illus., paper, $3. General and technical papers discussing air and water pollution problems and radioactive waste disposal.

PROTECTING YOUR HOME AGAINST TERMITES —Oscar Saxam—*Bookservice Pubs.*, 63 p., illus., paper, $2. Do-it-yourself advice for different kinds of construction.

PSYCHOTHERAPY IN THE SOVIET UNION—V. N. Miassischev and others, transl. and ed. by Ralph B. Winn—*Philosophical Lib.*, 207 p., $6. Collection of papers read at the 1956 conference on psychotherapy in the Soviet Union, many concerned with suggestion, hypnosis and speech therapy.

RAREFIED GAS DYNAMICS—L. Talbot, Ed.— *Academic Press*, 748 p., diagrams, $19. Proceedings of the Second International Symposium on Rarefied Gas Dynamics, held at the University of California, Berkeley, in 1960.

THE ROLE OF THE FEDERAL GOVERNMENT IN FINANCING HIGHER EDUCATION—Alice M. Rivlin —*Brookings*, 179 p., $3; paper, $2. Monograph provides background on the role and history of federal programs and points out issues that must be resolved.

SCIENTIFIC BASIS OF ELECTRICAL ENGINEERING—James M. Ham and Gordon R. Slemon— *Wiley*, 816 p., illus., $9.95. Intended as a first course in electricity and electrical engineering at the university level for engineering and science students.

SELECTED PAPERS OF A. H. STURTEVANT GENETICS AND EVOLUTION—E. B. Lewis, Ed., foreword by G. W. Beadle—*Freeman*, 334 p., illus., $7.50. Collection of important papers by an original member of the Morgan group of Drosophila workers, covering half a century of discoveries in the science of genetics.

SHARK FOR SALE—William Travis—*Rand McNally*, 181 p., photographs, $4.95. About the adventurous and risky business of shark-fishing in the Indian Ocean.

SPECIALIZED SCIENCE INFORMATION SERVICES IN THE UNITED STATES: A Directory of Selected Specialized Information Services in the Physical and Biological Sciences—*National Science Foundation (GPO)*, 528 p., paper, $1.75. Arranged by subject, gives brief descriptions of information service activities of 427 organizations or projects.

STABILITY BY LIAPUNOV'S DIRECT METHOD, WITH APPLICATIONS—Joseph La Salle and Solo-

mon Lefschetz—*Academic Press,* 134 p., diagrams, $5.50. Monograph gives detailed and elementary account of Liapunov's direct (second) method for the study of nonlinear systems.

STORIES FROM UNDER THE SKY—John Madson—*Iowa State Univ. Press,* 205 p., illus., $3.95. Stories about coons, shrews, mallards and other wildlife along the upper Mississippi.

SUPERSONIC AERODYNAMICS: A Theoretical Introduction—Edward R. C. Miles—*Dover,* 255 p., diagrams, paper, $1.45. First published in 1950.

THEORY OF PSYCHOANALYTIC TECHNIQUE—Karl Menninger—*Science Editions,* 206 p., diagrams, paper, $1.65. Reprint, explores the foundations of actual treatment techniques.

THERMODYNAMICS—Gilbert Newton Lewis and Merle Randall; rev. by Kenneth S. Pitzer and Leo Brewer—*McGraw,* 2nd ed., 723 p., $12.50. Updated classic in chemical literature, incorporates major advances in recent decades, presentation of material is designed as an introduction to research.

VACUUM TUBE CIRCUITS FOR THE ELECTRONIC EXPERIMENTER—Julian M. Sienkiewicz—*Ziff-Davis,* 177 p., illus., $4.95. Explains operation of diodes, triodes, tetrodes and pentodes, covers construction practices and presents 50 basic vacuum tube circuits.

YOU CAN SURVIVE THE BOMB—Col. Mel Lawrence with John Clark Kimball—*Quadrangle Bks.,* 194 p., illus., $3.95. Simply written, do-it-yourself advice, with appendix of tables on surface bursts and radii, shelter manufacturers, survival foods and civil defense offices.

• Science News Letter, 80:420 December 23, 1961

POLITICAL SCIENCE

U.S. Disarmament Goals

▶ THE UNITED STATES program for general and complete world disarmament eventually will require negotiations with all nations, including Red China. This is a fact of life recognized by the newly created Arms Control and Disarmament Agency.

"Obviously no meaningful arms reduction and disarmament agreement could be negotiated without every nation, including Red China, being a party to it," William C. Foster, head of the agency, acknowledged.

To get all nations to lay down their arms and give up force as a means of settling differences admittedly appears to be impossible. The role of the peacemaker has, in fact, been severely handicapped by the resumption of nuclear tests by Russia and continued failure to negotiate a nuclear test ban agreement between East and West, as well as the conflict in the Congo and Southeast Asia, the Berlin crisis, the French-Algerian dispute, the Portugal-Angola tensions, the unrest in Cuba and the Dominican Republic, the border clashes between Red China and India, and the lack of stability in the Middle East.

However, Mr. Foster's actions indicate that he firmly believes world disarmament not only is possible but that it can and, indeed, must be achieved. In the two months since his appointment, he has begun to set up the complex machinery to work out a detailed program for arms control, based on proposals made by the President before the United Nations in September, that can lead the way to total disarmament.

In formulating this program, he has assigned science and scientists a major role. "The age of atom and space, with both its promise and peril, is a creation of science and technology. The scientific community has, therefore, both the responsibility and the opportunity to make certain that their contributions may serve rather than destroy mankind," he said.

Preliminary research by the Agency's office of science and technology has suggested that, among other first step measures, arms limitation could usefully begin with strategic nuclear delivery vehicles with "inspection proportionate to disarmament."

The large size of nuclear delivery vehicles and the sites required for effective delivery may make it possible to devise a system of inspection by means of satellites. Unmanned satellite inspectors, it may be assumed, know no party lines or political bias.

Inspection is the key to the whole problem of disarmament and the Agency's efforts in this area are to establish effective inspection systems whose objectivity is beyond question. A program for manned inspection teams, working within the framework of the United Nations on a rotating basis to assure impartiality, is under study. A limitation of arms under proper inspection could bring a halt to the continuing arms race, which already has dangerously reduced world stability and security, for it would set a pattern of adherence to agreements essential to mutual trust. Disarmament and even arms control, the Agency believes, must be done on a step-by-step basis.

While the Soviets are on record as opposed to any step-by-step disarmament program with inspection and have publicly taken the "all or nothing" approach, their representatives have conceded that disarmament cannot be implemented all at once and that first steps will have to be taken. In fact, Aleksei Adzhubei, editor of Izvestia and Premier Khrushchev's son-in-law, told President Kennedy last month that "the Soviet Government does not exclude the possibility of reaching agreement on a number of measures which may decrease the danger of war and which could be effected in the nearest future."

The measures Adzhubei proposed included, among others, the freezing of military budgets, renunciation of the use of nuclear weapons, the establishment of a nuclear free zone, and a nonaggression pact between NATO and Warsaw pact countries.

Any meaningful agreement on arms control, however limited, between the Soviet Union and the United States in which countries from both East and West will participate conceivably could be extended by similar arrangements between NATO and the Warsaw Pact countries. President Kennedy is known to favor improved relations between these two blocs and told Khrushchev's son-in-law, "I think it would be helpful if NATO and the Warsaw Pact engaged in a commitment to live in peace with each other." The Administration has publicly recognized that such an agreement could mean a decline in the military buildup on both sides. It might, eventually, even mean the elimination of nuclear arms on a global basis.

The establishment of a nuclear free zone in Central Europe, as proposed under the Polish Rapacki plan favored by the Soviet Union, is too limited to be significant, it is believed. As has been noted, the countries involved — Poland, Czechoslovakia, East Germany and West Germany — presently have no nuclear capability. For denuclearization to be practical in any sense, it must be applied to an area as wide and far reaching as the firing range of an ICBM. And the U.S. disarmament agency intends for any denuclearization plan it may propose to be eminently practical.

The arms control and disarmament goals of the United States already have been defined many times by the President. Their achievement now is Mr. Foster's responsibility. To aid him, the Administration and Congress have made it possible for him to draw upon any Government agency and resource needed.

• Science News Letter, 80:421 December 23, 1961

PUBLIC SAFETY

U.S. Accidents Take 90,000 Lives Annually

▶ ACCIDENTS annually take a toll of 90,000 human lives and disable 9,000,000 in the United States, the National Safety Council reported.

Most of this tragic waste of life and limb can be prevented, the Council studies have shown, and prevention can begin in the home where many of the accidents occur. The principal victims of home accidents are persons under five and over 65.

The Council, a non-profit organization now in its 48th year, was chartered by Congress in 1953. Working with industry, state and municipal authorities, and civic groups, it has been responsible for the dramatic decline in accident death rates in the last generation.

In the last ten years, there has been a 7% reduction in the number of disabling on-the-job injuries per 100,000 workers.

For the last seven years work deaths have been constant in spite of a 9% increase in the nation's total work force and the introduction of many new technologies and materials. Most large companies have worked with the Council on safety programs, but similar programs must be instituted in the many small companies that do not have them, the Council states.

Howard Pyle, National Safety Council president, has said that "an accident statistic is a single human tragedy multiplied to a point of indifference." He pointed out that news and national sympathy will be concerned with one man or a family in danger, but taken as a whole 90,000 deaths move people less. The aim of the Council is to combat this indifference.

• Science News Letter, 80:421 December 23, 1961

GENERAL SCIENCE

News From Science Clubs

➤ NEW IDEAS for successful science and community activities, reported to Science Clubs of America by its 1961-62 affiliated clubs, are compiled by Miss Leslie Watkins, executive secretary, as follows:

THE SCIENCE EXPERIMENTERS from Phillips Academy, Andover, Mass., are publishing a journal of project reports by their students and from other independent schools.

THE SAN FERNANDO JUNIOR HIGH SCHOOL SCIENCE CLUB, San Fernando, Calif., uses displays to keep their school posted on the latest developments.

THE BIOLOGY SECTION of the North Catholic High School Science Club, Pittsburgh, Pa., continues working on their project of atherosclerosis in rabbits which they started over two years ago.

The chemistry students have organized a CHEMISTRY PROJECTS CLUB at Henry Snyder High School, Jersey City, N. J.

The young scientists of the MENA HIGH SCHOOL SCIENCE CLUB, Mena, Ark., present two radio programs each year in a "Know Your Schools" series.

In West Bridgewater, Mass., THE SCIENCE PROJECTS CLUB at the Howard School for Girls holds a group membership in the Science Museum of Boston and uses part of its meeting time as "Work Periods" when the girls develop their individual projects.

In East Bridgeport, Mass., THE SCIENTISTS of TOMORROW at Intermediate School are publicizing local stream pollution and initiating a Junior High Science Fair. This club's young scientists give annual awards to their club members based on a point system which they outline in their constitution.

THE SPENCER SIXTH FOR SCIENCE, the sixth graders at Spencer Elementary School, Spencer, N. C., have demonstrations at their Friday club meetings and "share time" in daily science classes.

Since their organization on Sept. 21, the WE DOOD ITS from Bangor High School, Bangor, Wis., are turning the monthly spotlight on the relation of science to local and state industries. Members are choosing projects that can relate to industries and other science interests in their locality.

THE SENIOR SCIENTISTS from the Jackson Jr. High School in Jackson, Tenn., are active in the Tennessee Junior Academy of Science, a cooperator with Science Clubs of America.

THE SHEELEY SCIENCE CLUB at McComb, Miss., furnishes scientific material for the Public Library.

The Educational Director at CANTERBURY SCHOOL, Accokeek, Md., reports that this new school uses science teaching equipment mainly handmade or from Science Service. These materials have already been of considerable help and the school plans to make use of all of them, especially the Science Clubs of America aids, during the present year.

Many science clubs publish their own journal or newsletter which they would like to exchange with other clubs. If your group is issuing a publication, it is invited to send a copy to SCA for listing in NEWS FROM SCIENCE CLUBS in the near future.

Science Clubs not already affiliated can do so, at no cost, simply by writing to Science Clubs of America, 1719 N Street, N.W., Washington 6, D. C.

• Science News Letter, 80:422 December 23, 1961

TECHNOLOGY

Underground Atom Test

➤ PROJECT GNOME, the underground nuclear experimental explosion detonated near Carlsbad, N. Mex., has been declared a qualified success.

The experiment, which was approved by President Kennedy less than two months ago, is the first field test of the safety and practicability of the U.S. Atomic Energy Commission's Plowshare Program to develop peaceful productive uses for atomic bombs.

It fell short of fully satisfying safety requirements which, prior to the explosion, AEC spokesmen were confident could be met, when some of the radioactivity released by the explosion escaped into the atmosphere.

For Project Gnome, the AEC detonated a five-kiloton nuclear bomb in a salt deposit 1,200 feet underground in an attempt to convert the released energy into heat for the production of power at low cost for industrial uses. Other objectives of this experiment are to learn more about the physical properties of matter by measuring the vast number of neutrons to be released by the explosion, and to attempt to recover the large amounts of industrially and medically useful radioisotopes such as cobalt, uranium and plutonium produced by the underground blast. These objectives were largely achieved.

But more important for the future use of explosions for peaceful purposes is satisfying the safety requirements. For underground explosions this means containment of radioactivity so that none escapes into the atmosphere or contaminates underground water sources. The AEC objective of full containment was not reached in Project Gnome.

If the radiation can be controlled, the destructive force of atomic weapons can be directed to such AEC Plowshare goals as the recovery of oil from tar sands and oil shales. Present theories are that this could be done by exploding an atomic bomb beneath a thick layer of oil sand at a depth of about 1,300 feet. A study is currently under way on using nuclear explosives to shatter a buried ore body that cannot be mined economically by conventional methods.

Project Chariot, a study on using A-bombs for excavation purposes and possibly the forerunner of large earth-moving projects, is also part of the AEC program.

• Science News Letter, 80:422 December 23, 1961

TECHNOLOGY

U.S. Ahead of Russia In Computer Sciences

➤ ONE TOP United States physicist with an advanced American computer can outproduce 1,000 Russian engineers, Dause L. Bibby, president of the Remington Rand Division of Sperry Rand Corporation, said in the keynote address at the Eastern Joint Computer Conference in Washington, D. C.

Pointing out that Russia is graduating three times as many engineers annually as the U.S., Mr. Bibby said, "We have a tool, the computer, that fills the gap."

The computer can extend and magnify the power of every American engineer. America today holds a commanding lead over the Soviet Union in computer technology. Although the lead has shrunk, we can keep it and enlarge it if we ourselves do not fall victims to complacency, he said.

Our industrial plant and equipment is aging. Two-thirds of it was built before 1950. By contrast, two-fifths of West Germany's plant and equipment is under five years of age. Much the same pattern is found in Japan, Italy, The Netherlands, Canada, and Sweden.

To stay ahead of Russia, not to mention the rest of the world, we must use America's human resources to capacity. Our engineers must do more work in less time than their foreign counterparts.

Commenting on the role of Government in helping the U.S. gain computer leadership, Mr. Bibby said that Federal agencies, particularly the military, were the first to perceive the value of computers, and have led the way.

• Science News Letter, 80:422 December 23, 1961

PUBLIC HEALTH

Ill Less Than 16 Days? Healthier Than Average

➤ IF YOU were ill for less than 16 days a year, you rate more healthy than average.

U.S. Public Health Service figures show that illness and injury cut down usual activity by that amount for the average person in the year ending June 30, 1960, the latest figures available. The average includes six days of bed disability.

More disability was experienced by women than men, and by persons over 45 than by those younger.

The comparable figures for the year ending June 30, 1958, were 20 days including eight days in bed, but that year had a flu epidemic.

• Science News Letter, 80:422 December 23, 1961

INVENTION

Patents of the Week

▶ AN IMPROVED nuclear reactor that produces more fissionable fuel than it uses has been patented.

A modification of the core portion for a fast neutron reactor won patent No. 3,011,962 for Leonard J. Koch, Clarendon Hills, Ill., Ralph E. Rice Jr. and Meyer Novick of Idaho Falls, Idaho, Alexander A. Denst, Chicago, and Anthony J. Rogers, Lisle, Ill. They assigned rights to the U. S. Atomic Energy Commission.

The Experimental Breeder Reactor-I first produced power in 1951 and proved that fissionable fuel could be produced at a greater rate than fissionable material was used in operating the reactor. When operating conditions were made severe, however, a fluctuation in power occurred.

To remedy, this the five AEC scientists changed the shape of the rods containing the fissionable materials so as to reduce the temperature changes causing the power fluctuations.

A new semi-automatic way of calculating how much radiation a specific part of the body will receive during radiotherapy won patent No. 3,011,700 for Cecil P. Barnard, Campbell, Calif., and James O. Beaumont, Los Gatos, Calif., who assigned rights to Vernon J. Pick, Saratoga, Calif.

For radiation treatments, it is often desirable to have a high-intensity radiation field throughout a specific but limited internal part of the body while maintaining a relatively low dosage in surrounding tissue. This is accomplished either by using many beams or by rotating either the patient or the beam source.

Until Mr. Barnard and Mr. Beaumont devised their method, plotting the radiation dosage was a time-consuming job of some 100 steps done by hand. Their invention provides a computer for semi-automatically plotting the radiation dose pattern corresponding to any selected beam source, only a few minutes being required for the calculation.

A movable sea platform particularly useful for off-shore oil exploration, drilling and producing operations won patent No. 3,011,467 for Robert G. LeTourneau of Longview, Texas.

It has the general shape of an isosceles triangle with a spud well located in each corner. The principal parts of the hull are sidewalls, bottom, upper or main deck, lower or inner deck, upper deck support beams, upper deck support columns, and lower deck support columns, and lower deck support bulkheads.

A cryogenic (very low temperature) computing device invented by Dudley A. Buck of North Wilmington, Mass., was awarded patent No. 3,011,711, rights of which were assigned to Research Corporation, New York.

Cyclones, not the kind that swirl in the earth's atmosphere but the kind used in industry to concentrate the solid particles of a slurry, are the subject of patent No. 3,011,638, awarded to Sidney Thomas Glover, of Widnes, England. He assigned patent rights to Imperial Chemical Industries Limited, London.

A combination altar and bookcase won patent No. 3,011,848 for Don G. Hasson of Le Roy, Minn. The bookcase can be easily converted into an altar that includes a kneeler, together with a panel on which to support a sacramental object such as a crucifix.

A batting practice device whereby a "baseball can be delivered to a batter standing in a simulated batter's box with speed and control comparable to that of a major league pitcher" was awarded patent No. 3,011,784. The inventor, Angelo Segretto of San Jose, Calif., assigned one-half rights to Joaquin E. Furtado, San Jose.

Another invention was a molded poultry nest and a process for making it, which won patent No. 3,011,477 for Glenn O. Bressler of State College, Pa., and Arthur G. Perry of Worcester, Mass. The nest has an opening at the rear to allow the egg, immediately after the hen has laid it, to roll into a collecting tray. Use of the device tends to prevent egg breakage and to keep the eggs clean. The nest can be made from vegetable or synthetic fibers, bonded together in a mold by natural rubber latex, neoprene or a suitable synthetic resin.

To help pre-school children learn arithmetic, Carl C. Hosbach of Rockwood, Mich., devised an educational toy that will help teach them to count. The objects to be counted, the number of objects as a numeral and the number of objects spelled out are displayed simultaneously on a base. A variety of masks can then be used to cover much of the base except the objects, number and word. The toy received patent No. 3,011,270.

• Science News Letter, 80:423 December 23, 1961

Questions

ASTRONOMY—What is the chemical composition of the star 3 Centauri A? p. 411.

GEOLOGY—Where was the new mineral, stishovite, found in a natural state? p. 413.

SPACE—How many years may man have to wait for intelligent signals from space? p. 414.

Photographs: Cover and p. 411, General Electric Company; p. 413, U. S. Geological Survey; p. 415, National Aeronautics and Space Administration; p. 424, Devcon Corp.

New Ideas and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 1123. To receive this Gadget Bulletin without special request each week, remit $1.50 for one year's subscription.

OVEN PROTECTOR to make oven cleaning easier is a non-toxic, odorless and tasteless product that comes in an aerosol container. Sprayed on the oven walls before cooking, it forms a protective shield that prevents food or grease from sticking. Instant drying, the material is equally useful on baking pans, waffle irons or outdoor grills.

• Science News Letter, 80:424 December 23, 1961

UNIQUE SCREWDRIVER has spring steel blades with V-shaped tips that grip the screw slot flush from top to bottom, permitting fast driving without slippage or marring of the screw head. Controlled by a push button in the handle, the driver will hold screws for starting even in hard-to-reach places. Available in 14 sizes.

• Science News Letter, 80:424 December 23, 1961

SILICONE SUDS-CONTROL CAKE used in electric floor scrubber suppresses foam. The two-inch-diameter cake controls excessive sudsing as dirty water is vacuumed from the floor, thus preventing overflow onto clean floor. The replaceable cake lasts about six months.

• Science News Letter, 80:424 December 23, 1961

TRANSPARENT GLUE made especially for invisible mending, as is being done for the pitcher shown in the photo-

graph, is said to make a hard permanent repair that resists water. It is prepared by combining equal amounts of the contents of two tubes, no heat or pressure being needed to apply the mixture. The adhesive will bond glass, china, metals or wood, and also repair furniture, lamps and luggage.

• Science News Letter, 80:424 December 23, 1961

MAGNETIC DIAL THERMOMETER for cars contains a built-in lifetime magnet and is installed by placing it against the dashboard. Only 1⅛ inches in diameter and with a range of minus 20 to 125 degrees Fahrenheit, it is easy to read. The thermometer can also be used on boats, freezers, or baby carriages.

• Science News Letter, 80:424 December 23, 1961

SEAT BELT POUCH is a double pouch for the automobile driver using a seat belt. Designed to carry cigarettes, change and other odds and ends, the pocket pouch keeps these items readily available within easy reach.

• Science News Letter, 80:424 December 23, 1961

DISPOSABLE RAZOR that eliminates razor cleaning and handling blades has the effective performance of a standard razor. Consisting of a sturdy one-piece plastic head and handle with a permanently locked-in steel blade, each razor is individually wrapped for instant use.

• Science News Letter, 80:424 December 23, 1961

SOLID GLASS BRICK brings daylight into fallout shelters. The material has a very high density and gives the same amount of protection as an equal thickness of concrete. The glass bricks, which meet Office of Civil Defense requirements, give 54% light transmission through a thickness of nine inches. This is sufficient for performing various tasks and easing the drain on battery-powered light sources.

• Science News Letter, 80:424 December 23, 1961

Nature Ramblings

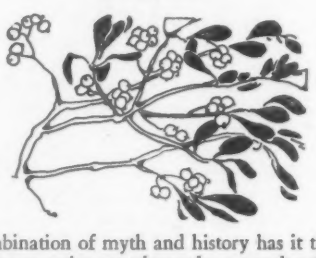
➤ THERE ARE 33 kinds of mistletoe native to the United States. They are known as the dwarf mistletoes and the American mistletoes. Of the American varieties, the common southeastern species *(Phoradendron flavescens)* is the one most of us know, for this is mistletoe gathered and sold for Christmas decorations.

The scientific name of the Christmas mistletoe comes from the Greek. It means thief and tree or "tree thief." This is an appropriate name; mistletoe is a semi-parasitic plant that thrives on the living tissues of such trees as elms, maples, oaks and sycamores.

Distinguished by light green leaves, minute yellow flowers and waxy white berries, mistletoe has a history that goes back to the time of the Druids. They worshipped the oak, and anything that grew on this tree was sacred.

The custom of kissing beneath the mistletoe began so long ago, no one is exactly sure how it originated. One belief is that it is a survival of a Scandinavian custom. A

Mistletoe



combination of myth and history has it that when enemies met beneath a tree bearing mistletoe, they stopped fighting and declared a truce, perhaps leading to the kissing custom.

The plant is particularly abundant in Oklahoma, for which it is the state flower. In this state most mistletoe grows in the tops of elms. Birds flock to these treetops to feed on the plant's seeds—a wildlife food from a plant depending upon its tree host for water and dissolved minerals.

• Science News Letter, 80:424 December 23, 1961

Do You Know?

Only 1,000 prairie *chickens*, once numerous all over Illinois, remain today.

The lines of force of the earth's *magnetic field* are nearly horizontal in the area 17 miles east of Lima, Peru.

The "breathability" of latex foam *rubber* is one of the important factors accounting for its popularity.

Microorganisms such as tiny bacteria are virtually unaffected by *radiation* that could destroy higher forms of life.

The freshness of *strawberries* can be extended for a significant period of time by low doses of radiation, experiments have shown.

The force to roll back the world's largest movable *roof*, sheathed by almost four acres of stainless steel, is controlled by a single push button.

• Science News Letter, 80:424 December 23, 1961